

WHAT IS CLAIMED IS:

1. A liquid container containing liquid to be supplied to a liquid consuming apparatus, comprising:

a container body;

5 a first reservoir chamber which is located within the container body and which is at least in part defined by a first flexible member;

a second reservoir chamber which is located within the container body and which is at least in part defined by a second flexible member;

10 a liquid delivery port formed in the container body;

a first flow path through which the first reservoir chamber is in fluid communication with the second reservoir chamber; and

15 a second flow path through which the second reservoir chamber is in fluid communication with the liquid delivery port,

wherein the second reservoir chamber expands to cause the second flexible member to reach a first position when pressure is applied through the first flexible member to the liquid existing 20 a predetermined amount or more in the first reservoir chamber.

2. The liquid container according to claim 1, further comprising:

25 a sensor which is disposed adjacent to the second reservoir chamber and which detects whether the second flexible member reaches the first position.

3. The liquid container according to claim 2, wherein the sensor includes:

a stationary contact fixed relative to the container body; and

5 a movable contact movable relative to the container body by the second flexible member.

4. The liquid container according to claim 3, wherein the movable contact is separated from the stationary contact when the second flexible member reaches the first position.

10 5. The liquid container according to claim 3, wherein the movable contact contacts the stationary contact when the second flexible member reaches the first position.

6. The liquid container according to claim 1, further comprising:

15 an urging member which urges the second flexible member in a direction from the first position to a second position.

7. The liquid container according to claim 6, wherein the urging member includes a bellows structure formed in the second flexible member.

20 8. The liquid container according to claim 6, wherein the urging member includes a spring disposed between the container body and the second flexible member and outside the second liquid reservoir chamber.

9. The liquid container according to claim 8, wherein 25 the urging member further includes an electrically conductive

plate disposed between the spring and the second flexible member.

10. The liquid container according to claim 8, wherein the urging member further includes a spring seat member movably supported by the container body and disposed between the spring and the second flexible member.

11. The liquid container according to claim 6, wherein the second reservoir chamber contracts to cause the second flexible member to reach the second position by the action of the urging member when the pressure applied through the first flexible member to liquid existing in the first reservoir chamber is released.

12. The liquid container according to claim 6, wherein the second reservoir chamber gradually contracts depending on consumption of the liquid by the liquid consuming apparatus after the liquid in the first liquid reservoir chamber has been consumed with the pressure continuously applied to the first flexible member.

13. The liquid container according to claim 1, further comprising:

20 an urging member which is disposed between the container body and the first flexible member and outside the first liquid reservoir chamber, and which urges the first flexible member to apply the pressure through the first flexible member to the liquid existing in the first reservoir chamber.

25 14. The liquid container according to claim 1, further comprising:

a window which is formed in the container body and which faces the first flexible member,

wherein an urging member of the liquid consuming apparatus is accessible to the first flexible member through the window to apply the pressure through the first flexible member to the liquid existing in the first reservoir chamber.

15. The liquid container according to claim 1, further comprising:

10 a sealed space, which is located within the container body, which is sealed from the second reservoir chamber and which faces the first reservoir chamber; and

a pressurized fluid introduction port which is formed in the container body and which is in fluid communication with the sealed space,

15 wherein pressurized fluid can be introduced into the sealed space through the pressurized fluid introduction port to apply the pressure through the first flexible member to the liquid existing in the first reservoir chamber.

16. The liquid container according to claim 15, 20 wherein the sealed space is at least in part defined by the first flexible member.

17. The liquid container according to claim 15, wherein the sealed space is at least in part defined by a third flexible member contactable with the first flexible member.

25 18. The liquid container according to claim 16,

wherein the container body includes:

a first case member that has a first recess and the first flexible member closing an opening of the first recess and that defines the first liquid reservoir chamber; and

5 a second case member that has a second recess and that is coupled to the first case member to define the sealed space by the second recess and the first flexible member.

19. The liquid container according to claim 17,
wherein the container body includes:

10 a first case member that has a first recess and the first flexible member closing an opening of the first recess and that defines the first liquid reservoir chamber; and

a second case member that has a second recess and the third flexible member closing an opening of the second recess
15 and that defines the third recess,

wherein the second case member is coupled to the first case member to contact the third flexible member with the first flexible member.

20. The liquid container according to claim 19,
wherein the first case member has a fourth flexible member forming
25 a bottom of the first recess and opposite to the first flexible member.

21. The liquid container according to claim 18 or 19, wherein the pressurized fluid introduction port is formed
25 in the second case member.

22. The liquid container according to claim 18 or 19, wherein the first case member has a third recess having an opening closed by the second flexible member to define the second liquid reservoir chamber.

5 23. The liquid container according to claim 22, wherein the first flexible member and the second flexible member are constructed by a single common film member attached to the first case member.

10 24. The liquid container according to claim 1, further comprising:

a liquid injection port formed in the container body; a third flow path which is at least in part defined by the container body and which is for communicating the liquid injection port with the first reservoir chamber.

15 25. The liquid container according to claim 24, wherein the container body includes:

20 a first case member that has a first through hole, the first flexible member closing an opening of the first through hole, a first groove connecting the first through hole to the liquid injection port and a third flexible member closing an opposite opening of the first through hole and an opening of the groove to respectively define the first liquid reservoir chamber and the third flow path.

25 26. The liquid container according to claim 25, wherein the first case member has a second through hole, the

second flexible member closing an opening of the second through hole, and a fourth flexible member closing an opposite opening of the second through hole to define the second reservoir chamber.

27. The liquid container according to claim 26,
5 wherein the third flexible member and the fourth flexible member is constructed as a single common film member.

28. The liquid container according to claim 27,
wherein the first case member has a second groove connecting
the first through hole to the second through hole, and an opening
10 of the second groove is closed by the single common film member
to define the first flow path.

29. The liquid container according to claim 28,
wherein the second flow path is at least in part defined by the
single common film member.

15 30. The liquid container according to claim 25,
wherein the first case member has a partition wall that is located
in the first groove and that is attached to the third flexible
member to divide the third flow path into a first region in fluid
communication with the first reservoir and a second region in
20 fluid communication with the liquid injection port.

31. The liquid container according to claim 30,
further comprising:

a seal member attached to the first case member and closing
the liquid injection port.

25 32. The liquid container according to claim 6,

wherein:

the urging member has a movable part contacting the second flexible member;

5 an opening of the first flow path to the second reservoir chamber is closed by the movable part via the second flexible member located at the second position when the pressure applied through the first flexible member to liquid existing in the first reservoir chamber is released.

33. The liquid container according to claim 6,
10 wherein:

the urging member has a movable part contacting the second flexible member;

15 an opening of the second flow path to the second reservoir chamber is closed by the movable part via the second flexible member located at the second position when the pressure applied through the first flexible member to liquid existing in the first reservoir chamber is released.

34. The liquid container according to claim 1, further comprising:

20 an IC module which has an antenna member and which is disposed within the container body.

35. The liquid container according to claim 34, further comprising:

25 a sensor which is disposed adjacent to the second reservoir chamber, which detects whether the second flexible member reaches

the first position, and which is electrically connected to the IC module.

36. A liquid container for storing liquid to be supplied to a liquid consuming apparatus, which is constructed such that pressurized fluid is sent to its inside so that the liquid in the inside is delivered to the outside, the liquid container comprising:

a container body which stores the liquid in its inside, the container body including:

10 a pressurized fluid introduction port for introducing the pressurized fluid to the inside; and

a liquid delivery port for delivering the liquid to the outside; and

15 a detection unit which is provided in the container body and outputs an output signal which is changed in accordance with a change in pressure of the liquid in the inside of the container body.

37. The liquid container according to claim 36, further comprising:

20 a liquid reservoir chamber which is formed in the inside of the contain body and stores the liquid and whose volume is decreased by receiving pressure of the pressurized fluid; and

25 a sensor chamber which is formed in the inside of the container body and communicates with the liquid reservoir chamber, wherein:

the pressure of the pressurized fluid applied to the liquid in the inside of the liquid reservoir chamber is transmitted through the liquid to the liquid in the inside of the sensor chamber; and

5 the output signal of the detection unit is changed in accordance with the pressure change of the liquid in the inside of the sensor chamber.

38. The liquid container according to claim 37, wherein:

10 the sensor chamber is constructed such that the volume thereof is changed in accordance with the pressure change of the liquid in the inside thereof; and

the output signal of the detection unit is changed in accordance with a volume change of the sensor chamber.

15 39 A liquid container constructed such that: a pressure is applied to liquid in a liquid containing chamber by a pressure of a pressurized fluid fed from a pressurized fluid introduction port to feed the liquid to a liquid consuming apparatus from a liquid delivery port; liquid in a liquid containing chamber 20 is selectively pressurized from outside to feed the liquid in the liquid containing chamber to a liquid consuming apparatus from a liquid delivery port; or liquid in a liquid containing chamber is constantly pressurized by a built-in pressurizing unit to feed the liquid to a liquid consuming apparatus from 25 a liquid delivery port, the liquid container comprising:

a buffer chamber connected to a channel for connecting the liquid containing chamber to the liquid delivery port, wherein:

the buffer chamber is expanded in its volume by an inflow of the liquid from the liquid containing chamber to the buffer chamber, and contracted when the inflow of the liquid from the liquid containing chamber to the buffer chamber is stopped; and

a detecting unit adapted to detect a volume variation of the buffer chamber.

10 40. The liquid container according to claim 39, wherein the buffer chamber is disposed in an area blocked from the pressure of the pressurized fluid.

15 41. A liquid container for storing therein liquid to be supplied to a liquid consuming apparatus, the liquid container comprising:

a container body having a liquid delivery port for delivering the liquid to the outside;

a first reservoir chamber formed in the inside of the container body and for storing the liquid;

20 a first pressurizing unit capable of pressurizing the liquid in the first reservoir chamber;

a second reservoir chamber which is formed in the inside of the container body and communicates with the first reservoir chamber and the liquid delivery port and in which pressure in the first reservoir chamber is transmitted through the liquid.

to the liquid in its inside;

a second pressurizing unit for pressurizing the liquid in the second reservoir chamber to delivery the liquid through the liquid delivery port; and

5 a detection unit which is provided in the container body and whose output signal is changed in accordance with a change of pressure of the liquid in the second reservoir chamber,

10 wherein $P_1 > P_2 > P_3$ is established where a pressure applied to the liquid in the first reservoir chamber by the first pressurizing unit is P_1 , a pressure applied to the liquid in the second reservoir chamber by the second pressurizing unit is P_2 , and a pressure loss in a liquid flow path from the liquid container to the liquid consuming apparatus is P_3 .

42. The liquid container according to claim 41,
15 wherein when a pressure of the liquid in the second reservoir chamber is P , the output signal of the detection unit is changed according to $P > P_2$ or $P < P_2$.

43. The liquid container according to claim 41,
further comprising:

20 a memory unit for storing a liquid reservoir amount in the inside of the container body, and data relating to the liquid reservoir amount stored in the memory unit is rewritten into a predetermined amount at the point of time when the output signal of the detection unit is changed.

25 44. The liquid container according to claim 41,

wherein:

the pressure P_2 applied to the liquid in the second reservoir chamber by the second pressurizing unit is changed between $P_2\text{-MAX}$ and $P_2\text{-MIN}$ in accordance with the amount of the liquid stored in the inside of the second reservoir chamber, and

$P_1 > P_2\text{-MAX} > P_2\text{-MIN} > P_3$ is established.

45. The liquid container according to claim 41, wherein when a water head difference of the liquid container relative to a liquid discharge part of the liquid consuming apparatus is P_7 , $P_1 > P_2 > P_3 - P_7$ is established.

46. A liquid container for storing therein liquid to be supplied to a liquid consuming apparatus, the liquid container comprising:

15 a container body having a pressurized fluid introduction port for introducing pressurized fluid into the inside and a liquid delivery port for delivering the liquid to the outside; a first reservoir chamber which is formed in the inside the container body, stores the liquid, and includes a first flexible film constituting at least a part of a wall forming the first reservoir chamber;

20 a first pressurizing unit for applying pressure of the pressurized fluid to the first flexible film to deform the first flexible film;

25 a second reservoir chamber which is formed in the inside

of the container body, communicates with the first reservoir chamber and the liquid delivery port, and includes a second flexible film constituting a part of a wall forming the second reservoir chamber and in which the second flexible film seals a substantially 5 circular or regular polygonal opening formed by the rigid wall forming the second reservoir chamber, and the pressure of the pressurized fluid applied to the liquid in the first reservoir chamber is transmitted through the liquid to the liquid in the inside of the second reservoir chamber;

10 a second pressurizing unit which pressurizes the liquid in the second reservoir chamber to deliver the liquid from the liquid delivery port in a state where the liquid in the first reservoir chamber is consumed and the pressure of the pressurized fluid is not transmitted to the liquid in the inside of the first 15 reservoir chamber, and includes a press member for pressing the second flexible film toward a direction of decreasing a volume of the second reservoir chamber; and

20 a detection unit which is provided in the container body and whose output signal is changed in accordance with a change of pressure of the liquid in the second reservoir chamber.

47. A liquid container for storing liquid to be supplied to a liquid consuming apparatus, which is constructed such that pressurized fluid is sent into its inside so that the liquid in the inside is delivered to the outside, the liquid 25 container comprising:

5 a tank unit which includes a sealed liquid reservoir chamber for storing the liquid, and a liquid delivery port communicating with the liquid reservoir chamber and for delivering the liquid to the outside of the liquid container and in which

10 a volume of the liquid reservoir chamber is changed in accordance with an amount of the liquid stored in the inside thereof; and

15 a pressurizing unit which includes a sealed pressurizing chamber into which the pressurized fluid is introduced to change a volume, and a pressurized fluid introduction port communicating with the pressurizing chamber and for introducing the pressurized fluid to the inside of the pressurizing chamber, and is constructed to pressurize the liquid reservoir chamber of the tank unit by a volume change of the pressurizing chamber.

20 48. The liquid container according to claim 47, wherein the tank unit further includes a memory unit for storing information relating to the liquid stored in its inside.

25 49. The liquid container according to claim 47, wherein the tank unit and the pressurizing unit are respectively formed as separate bodies and are fixed to each other by heat caulking.

50. The liquid container according to claim 47, wherein the tank unit includes an erroneous mounting prevention unit for preventing the liquid container from being erroneously mounted to a liquid consuming apparatus other than the suitable liquid consuming apparatus or to a position other than a suitable

position of the suitable liquid consuming apparatus.

51. A liquid container for storing therein liquid to be supplied to a liquid consuming apparatus, the liquid container comprising:

5 a detection unit for digitally detecting whether an amount of liquid stored in the inside of the liquid container is a predetermined value or more or not; and

10 a communication unit for communicating an output signal of the detection unit to the liquid consuming apparatus by an electric wave.

52. The liquid container according to claim 51, wherein the detection unit includes a switch unit in which a conduction state and a non-conduction state are switched by whether the amount of the liquid stored in the inside of the liquid container

15 is the predetermined value or more or not.

53. The liquid container according to claim 52, wherein the switch unit includes a conductive elastic member at least a part of which is elastically deformed in accordance with a state change as to whether the amount of the liquid stored

20 in the inside of the liquid container is the predetermined value or more or not.

54. The liquid container according to claim 53, wherein the conductive elastic member includes:

25 a movable side terminal at least a part of which is displaced in accordance with the state change as to whether the amount

of the liquid stored in the inside of the liquid container is the predetermined value or more or not, and

a fixed side terminal which is disposed to be opposite to the movable side terminal and in which the contact state and the non-contact state relative to the movable side terminal are switched by the displacement of the movable side terminal.

5 55. The liquid container according to claim 53, wherein the detection unit includes a press unit which is displaced when the amount of the liquid stored in the inside of the liquid 10 container becomes less than the predetermined value, to thereby press and displace at least a part of the conductive elastic member.

15 56. The liquid container according to claim 51, wherein the predetermined value is set as an amount of liquid necessary for processing a unit amount or more of material to be processed by the liquid consuming apparatus.

57. A liquid container for storing therein liquid to be supplied to a liquid consuming apparatus, the liquid container comprising:

20 a detection unit for detecting a remaining amount of liquid in the inside of the liquid container; and
an IC module electrically connected to the detection unit, the IC module including:

25 plural terminals coming in contact with the detection unit to achieve electrical conduction; and

an antenna member for communicating an output signal of the detection unit to the liquid consuming apparatus by an electric wave,

5 wherein the plural terminals are disposed side by side along a long side direction of the IC module.

58. The liquid container according to claim 57, wherein the antenna member is formed of a coil-shaped pattern, and the plural terminals are disposed inside the antenna member formed of the coil-shaped pattern.

10 59. The liquid container according to claim 57, wherein the antenna member is formed of a coil-shaped pattern, and the plural terminals are disposed outside the antenna member formed of the coil-shaped pattern.

15 60. A liquid container for storing liquid to be supplied to a liquid consuming apparatus, which is constructed such that pressurized fluid is introduced into its inside so that the liquid in the inside is pressurized and is delivered to the outside, the liquid container comprising:

20 a container body having a pressurized fluid introduction port for introducing the pressurized fluid into the inside and a liquid delivery port for delivering the liquid to the outside;

25 a first liquid reservoir chamber which is formed in the inside of the container body, stores the liquid, and is constructed such that its volume is decreased by receiving pressure of the pressurized fluid;

a second liquid reservoir chamber which is formed in the inside of the container body and communicates with the first liquid reservoir chamber and in which the pressure of the pressurized fluid applied to the liquid in the inside of the 5 first liquid reservoir chamber is transmitted through the liquid to the liquid in the inside of the second liquid reservoir chamber and its volume is changed in accordance with pressure of the liquid in the inside changed by transmission of the pressure of the pressurized fluid; and

10 a narrow flow path which is formed at a midway of a liquid flow path communicating the first liquid reservoir chamber and the liquid delivery port, and is openably closed by a movable part displaced in accordance with the change of the volume of the second liquid reservoir chamber in a state where the liquid 15 in the first liquid reservoir chamber is not pressurized by the pressurized fluid.

61. The liquid container according to claim 60, wherein:

20 at least a part of a wall forming the second liquid reservoir chamber is constituted by a flexible film,

the movable part includes at least a part of the flexible film, and

25 the narrow flow path is closed by the flexible film displaced to decrease the volume of the second liquid reservoir chamber.

62. The liquid container according to claim 61,
further comprising:

a press mechanism for pressing the flexible film toward
a direction of decreasing the volume of the second liquid reservoir
5 chamber, wherein

the magnitude of pressure applied to the flexible film by
the press mechanism is set to such a value that the second liquid
reservoir chamber can be expanded when the pressure of the
pressurized fluid is transmitted through the liquid to the liquid
10 in the inside of the second liquid reservoir chamber.

63. The liquid container according to claim 60,
wherein:

the narrow flow path is formed in a flow path for connecting
the second liquid reservoir chamber and the liquid delivery port,
15 or

the narrow flow path is formed in a flow path for connecting
the first liquid reservoir chamber and the second liquid reservoir
chamber.

64. The liquid container according to claim 60,
20 wherein the narrow flow path includes a small hole in which a
ring-shaped projection is formed, on a side where it is closed
by the movable part.

65. The liquid container according to claim 64,
wherein at least a portion of the ring-shaped projection with
25 which the movable part comes in contact is made of an elastic

material.

66. A method of manufacturing a liquid container for storing liquid to be supplied to a liquid consuming apparatus, the method comprising:

5 a case member providing step of providing a case member formed with a liquid reservoir chamber into which the liquid is to be filled,

wherein the case member includes a liquid injection port for injecting the liquid into an inside of the case member, a liquid injection passage communicating the liquid injection port with the liquid reservoir chamber, and a liquid delivery port communicating with the liquid reservoir chamber for delivering the liquid from the liquid container to the liquid consuming apparatus,

15 wherein a partition wall for closing the liquid injection passage is provided in the liquid flow passage, wherein a part of the wall surface forming the liquid reservoir chamber and a part of a wall surface forming the liquid injection passage are constructed by a flexible film, and

20 wherein the flexible film is provided over a top surface of the partition wall but is not attached to the top surface of the partition wall;

25 a liquid injection step of injecting the liquid from the liquid injection port into the liquid injection passage so that the liquid flows into the inside of the liquid reservoir

chamber through a clearance formed between the top surface of the partition wall and the flexible film; and

5 a passage closing step of closing a flow passage of the liquid by attaching the flexible film onto the top surface of the partition wall after the injection of the liquid into the inside of the liquid reservoir chamber is complete.

67. The method according to claim 66, wherein:

10 a projecting part for defining the clearance between the flexible film and the top surface of the partition wall is formed on the top surface of the partition wall of the case member provided in the case member providing step, and

in the flow passage closing step, the projecting part is melted so that the flexible film is welded to the top surface of the partition wall.

15 68. The method according to claim 67, further comprising:

a fluid discharge step after the case member providing step is complete and before the liquid injection step starts,

20 wherein in the fluid discharge step, the liquid injection port is closed, and fluid inside the liquid reservoir chamber and the liquid injection passage is discharged from the liquid delivery port.

69. The method according to claim 67, wherein the flexible film is attached to a top surface of the projecting part formed on the top surface of the partition wall of the case

member provided in the case member providing step.

70. The method according to claim 66, further comprising:

5 after the flow passage closing step is complete, a vacuum-discharge step of vacuum-discharging, via the liquid injection port, the liquid existing between the liquid injection port and the partition wall.

71. The method according to claim 70, further comprising:

10 an injection port closing step of closing the liquid injection port after the vacuum-discharge step is complete.

72. A liquid container for storing liquid to be supplied to a liquid consuming apparatus, the liquid container comprising:

15 a case member formed with a liquid reservoir chamber into which the liquid is to be filled, the case member including:

a liquid injection port for injecting the liquid into an inside of the case member,

20 a liquid injection passage communicating the liquid injection port with the liquid reservoir chamber, and a liquid delivery port communicating with the liquid reservoir chamber for delivering the liquid from the liquid container to the liquid consuming apparatus, wherein:

25 a partition wall for closing the liquid injection passage is provided in the liquid flow passage;

a part of the wall surface forming the liquid reservoir chamber and a part of a wall surface forming the liquid injection passage are constructed by a flexible film;

5 the flexible film is provided over a top surface of the partition wall;

in a state in which the flexible film is not attached to the top surface of the partition wall, the liquid is injected from the liquid injection port into the liquid injection passage so that the liquid flows into the inside of the liquid reservoir chamber through a clearance formed between the top surface of 10 the partition wall and the flexible film; and

15 a flow passage of the liquid is closed by attaching the flexible film onto the top surface of the partition wall after the injection of the liquid into the inside of the liquid reservoir chamber is complete.